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ENTOMOLOGICAL NEWS

VOL. LVI APRIL, 1945 No. 4

Could the Widespread Use of DDT be a Disaster? [1]

By E. H. STRICKLAND, University of Alberta

By popular report, the potentialities of DDT as an insecticide are so great that it is postulated that its employment may result in the termination of most of our insect tribulations. Such scientific investigations as have as yet been possible hardly support the sweeping claims of the popular articles, but they do point to a very real danger, if the reported results of one moderately large "field" experiment approach accuracy.

It has been stated that, in Pennsylvania, the treatment of a 20-acre tract of forest-land with DDT resulted in the almost total destruction of many forms of insect life in this area. If there is any truth to this statement, it would appear to be most fortunate that the experiment was limited to 20 acres.

The factors which maintain the equilibrium between the abundance of the vast majority of plant-feeding insects and their predatory and parasitic insect enemies are so delicately, and yet so satisfactorily, adjusted that man is in serious danger of producing disastrous consequences for himself if he attempts to interfere, other than to a very limited extent, with the "centre of balance." If he succeeds in deflecting it seriously, the "rebound" is liable to be very unpleasant, if not disastrous, for him during the next few years.

In this connection, it must be constantly borne in mind that the correct *density* in population, both of host and of parasite, is as rigid a requirement of a stable equilibrium as is their *relative abundance*.

[1] See Conant, No Joy in an Insect-Free World. Ent. News, 55: 258–259, 1944.

Fortunately, the occasions on which man has found it to be necessary for him to make widespread and intensive attempts to assume the role of nature in maintaining some kind of an equilibrium normally occur only when vagaries in the weather have permitted a temporary swing towards the super-abundance of some particular insect which is detrimental to his interests.

Such attempts as he then makes to reduce the surplus are all to the good since, to a certain extent, he is assisting in the re-establishment of a normal density of population among the host insects in addition to affecting a better ratio between their numbers and those of its enemies. Even at such times, however, it is owing to the fact that he has been only partially successful in exterminating the pest that its all-important enemies retain their ability to increase once more and, ultimately, to re-gain their ascendancy over it.

It is the unremitting decimation, by their enemies, of the hundred-and-one foliage feeding insects which inhabit every wood-lot that prevents each of them from becoming a pest of similar magnitude to other insects, such as the gypsy moth, whose only crime against the residents of America is the fact that it arrived in this Country minus its own complement of special enemies. Every native foliage feeder possesses just about the same potentialities for increase and destructive ability when it is given an opportunity to escape from the attentions of its ever-present enemies.

Fortunately, the complete elimination of any plant-feeding insect, by control measures, from small, more or less scattered, areas has little effect upon their subsequent abundance. Such small vacua are quickly re-invaded, not only by the plant-feeder itself but also by its enemies, and the slight "jolt" which may have been given to equilibrium in such areas is hardly appreciable.

Suppose, however, that the application of DDT to fairly large areas, such as several square miles, in connection with the control of some particularly injurious insect which was, at the time, occurring in outbreak numbers did result in the elimination of,

let us say, a dozen additional plant-feeders, all of which, when in a state of equilibrium with their enemies, are to all intents and purposes innocuous. It would matter little whether, at the same time, it directly killed their parasites as well as themselves. The elimination of their hosts for a single season would assure, in addition, as complete an elimination of the parasites unless some alternative host of sufficient similarity to their normal one to meet their requirements had somehow escaped the general devastation among the plant-feeders.

It could, however, be but a matter of a few years thereafter that the flying adults of one or more of these evicted natives, aided possibly by favourable winds at the time of their flight, reinvaded the cleared area from surrounding unaffected territory. It is almost impossible to visualize the possibility that a suitable number of their parasites, since they are on the wing at entirely different seasons of the year, will accompany them and thus be capable of re-establishing equilibrium without delay. Any which were unfortunate enough to re-enter the area at any time before the return of their hosts would, of course, "die without issue."

For this reason, any efforts which were made to eliminate a really injurious pest from a large area could not be relied upon to give permanent respite from it. Not only might they entail subsequent ultra-severe infestations from the pest itself but, at the same time, there is a very real danger that they would inaugurate temporary outbreaks of many another insect which, in so far as man is concerned, has always been in a sufficiently stable state of equilibrium with its parasites never to have occurred in sufficient numbers to constitute a menace of any kind.

Were this to occur, the only method man could adopt, unless he were prepared to accept and to live through the "outbreaks" which he had brought on himself, would be to repeat the treatment every few years thereafter. He would, thus, assume the laborious and expensive task of an annual reduction in the population of many an insect which, but for his interference, would have been assured, free of cost and human labour, by natural equilibria.

The regularly recurring outbreaks of the Forest Tent Caterpillar are due largely to the fact that, by the end of all such outbreaks, their parasites have become so excessively abundant that, in the year following the last in which the "outbreak" occurred, they caused a 100% mortality among the few survivors and, in consequence, they themselves are eliminated from vast areas. It is only in some subsequent year, when, from some area beyond the limits of the earlier outbreak, and where normal equilibrium has been maintained, some of the moths fly, or are carried by high winds, back into the freed area that we realize the tragedy of the fact that the earlier complete elimination of the pest resulted in an inevitable disappearance of its enemies. Very soon thereafter the caterpillar population has been built up to outbreak proportions and it is usually only after about three years of almost complete defoliation of the trees that the parasites, which are now able to reinvade the territory successfully, finally bring them once more under subjection.

In the meantime, to the obvious damage to the trees must be added the human discomfort of armies of countless hungry caterpillars which swarm over the countryside and are no respecters of houses, inside as well as out, in their search for food.

How much more severe troubles may man be storing up for himself if he employs DDT on a widespread scale and it approaches in effectiveness the claims which are made for it?

The place for its invaluable employment is surely confined to relatively small areas, such as the inside of 'planes or buildings or in gardens and orchards in which its use can not seriously affect the "balance of nature" throughout large tracts of land. It is somewhat gratifying to realize that its efficiency as a universal exterminator of insect life may prove to be somewhat less pronounced than many people believed it might be but, should it even approach its claimed toxicity to plant-feeding insects in general, its *widespread* employment over large connected areas might constitute an entomological disaster of the first magnitude.

Notes on Some Microlepidoptera

By Emlen P. Darlington, New Lisbon, Burlington County, New Jersey

(*Continued from page 74*)

Tortricidae

Peronea trisignana Robinson

Larva dull green; head and cervical shield black; black warts on prothorax; fore legs black. Skeletonizing leaves of white birch (*Betula populifolia*), also reared on river birch (*B. nigra*). The larva generally folds a white birch leaf at the midrib and feeds under this fastened down protection. It also feeds between two firmly attached leaves. Pupa in the area of last feeding, usually near the base of the leaf and attached by a few silken threads at the caudal end, otherwise naked. Naked pupae also in the trash of fallen leaves. Pupation in October. Imagos, October 25 to November 17.

Robinson, Trans. Am. Ent. Soc., II, 1869, p. 282.
McDunnough, Can. Jour. of Research, II, 1934, p. 314.
Forbes, Memoirs 68, Cornell Univ. Agr. Exp. Sta., 1923, p. 483.

Gelechiidae

Recurvaria robiniella Fitch

Larva between two leaflets of locust (*Robinia pseudacacia*). "Fitch collected his leaves in the autumn." It is best to delay gathering them until late in October, when they are about ready to fall; even then some larvae will be immature. It is well to remember that a locust branch sheds its leaves readily when caged. Pupation is between two leaflets, in a slight silken web, or in tightly curled dead leaves, naked, or surrounded by a loose web of silk and soil. Imagos, June 1 to July 16.

Busck, Proc. U. S. N. M. XXV, 1903, p. 812.

Gelechia argentipunctella Ely

Larva from Beltsville, Md., feeding on arbutus leaf. Pupa in folded over leaf. Imago, April 28.

Stegasta bosquella Chambers

Food plant recorded as *Cassia chamaecrista robusta,* a large flowered sensitive pea or Prairie Senna. A sizable series was reared by L. J. Bottimer at Lake Alfred, Florida, feeding in the flower heads of *Kuhnistera pinnata.* Imagos in November. I did not see the larvae but the imagos check with *S. bosquella.*

Busck, Proc. U. S. N. M. XXV, 1903, p. 864.

Anacampsis agrimoniella Clemens, *Anacampsis lupinella* Busck, and *Anacampsis tristrigella* Walsingham

Very likely but food variants of the same species. I have reared on *Baptisia tinctoria* four specimens, combining the characteristics of *A. agrimoniella* and *A. lupinella.* They have the dark bronze coloring, the reddish eyes, the needle-like palpi, the annulate antenna, and one has the white fascia as in *A. agrimoniella,* but less clearly defined; it also has the three brown spots that are sometimes seen on *A. agrimoniella,* one near the base, one in the fold and one at end of cell. In another specimen the fascia is absent as in reared specimens of *A. lupinella.* The other two have fascias indicated and incomplete. 14 mm. The larva has a pale brown head and cervical shield and very black tubercles. Food, *Baptisia tinctoria* at Hicksville, Long Island. Larvae taken by L. J. Bottimer. Imagos, June 20.

I can see no justification for the erection of a new species, based solely on the discovery of a new food plant.

Busck, Proc. U. S. N. M. XXV, 1903, p. 850.
Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 279.

Compsolechia kearfottella Busck

In the Academy collection is a specimen of *Compsolechia* (or *Anacampsis*) *kearfottella* Busck, reared by F. M. Jones on *Azalea viscosa.*

Busck, Proc. U. S. N. M. XXV, 1903, p. 842.

Dichomeris bipunctellus Walsingham

As no food plant has been recorded I will mention that I have reared it on sweet fern (*Comptonia asplenifolia*), the larva in a webbed nest in the tips. Imagos, July 3 to 9.

Walsingham, Trans. Am. Ent. Soc., X, 1882, p. 186.

Gracillariidae

Lithocolletis trinotella Braun

An underside miner on red, norway, and possibly other species of maple. The larva is active in the small oval mine until late in October. Pupation in the puckered mine. Imagos, May 15 to June 1. They can be taken on the wing by May 1. Braun says, "In the apical portion (of fore wing) there are two costal white wedge-shaped streaks and a similar dorsal one just before the tornus, opposite the first costal streak." Forbes says, "there are three white costal streaks and two dorsal streaks," and according to my reared material this is correct. Distinguished from *L. quercialbella* Fitch, by rearing.

Braun, Ent. News, XIX, 1908, p. 99.
Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1923, p. 189.

Lithocolletis crataegella Clemens

Have reared it as an underside miner on apple. Mine near base, along midrib and confined between two lateral veins. Larva hibernates for a time in the brown puckered mine. Pupation late in November under a silken cover in the mine. Frass in a ball in center of mine. Imagos, early May and on. Clemens observed that the larva would desert one mine and form another. I have observed the same behavior.

Clemens, Proc. Acad. Nat. Sci. Phil. 1859, p. 324; 1860, p. 208.
Braun, Trans. Am. Ent. Soc., XXXIV, 1908, p. 301.

Gracillaria packardella Chambers

As stated by Chambers, "the larva soon leaves it [the mine] (which is hardly noticeable) to feed on the under side of the

leaf." It pupates, usually in the trash on the ground; in the rearing cage, on a leaf or on sleeve of cage. I have reared it on sugar and Norway maple.

Imagos, early May into June. On the wing all summer.

Parasite, *Zootrephes scapulatus* Davis.

Chambers, Can. Ent., IV, 1872, p. 27; Cin. Quart. Jn. Sci., II, 1875, p. 227.

Phyllocnistis liriodendronella Clemens and *Phyllocnistis magnoliella* Chambers

I have specimens reared on *Liriodendron tulipifera* and on *Magnolia virginiana* and cannot distinguish between them. Their larval work and method of pupation is the same. The mine is a long, tortuous tract, on the under side of the tender leaves of tulip poplar and magnolia, "starting near the outer margin and continuing until a large portion of the under epidermis is detached, giving the area a bluish-white cast." Pupation is naked in a small pocket-like case, made by turning under the edge of a leaf for not more than 10 mm., and fastening the flap loosely. It is usually on the edge of the leaf furthest from the mine. Pupae are plentiful on *Magnolia virginiana* but on *Liriodendron tulipifera* the pupal cases are usually empty, giving rise to the belief that magnolia is the natural food and that eggs are deposited on Liriodendron leaves by moths matured on Magnolia.

Similar mining was observed on sweet gum (*Liquidambar*). Pupal cases were made but never occupied. I have never found them again on sweet gum.

Clemens, Proc. Ent. Soc. Phil., II, 1863, p. 13.
Chambers, Can. Ent., III, 1871, pp. 185, 206.

Pyralidae

Phlyctaenia tertialis Güenee

Merely to call attention to the records that would indicate it to be a general feeder.

Larvae taken in webbed leaves of elder (*Sambucus*) October

25, hibernated in any sheltered area until June 10. Imagos, June 22 to 26, all dark form.

Balduf, W. V., Proc. Ent. Soc. Wash., XXXII, 1930, pp. 31, 36.

Pyrausta pertextalis Lederer

Seems to be a general feeder. F. M. Jones reared it at Martha's Vineyard, Mass. on *Clethra alnifolia,* the moths emerging July 27 to Aug. 11. At New Lisbon, N. J., I reared it webbing the terminal shoots of *Chenopodium album* (lamb's quarters), the moths emerging Aug. 10.

New Jersey Light-trap Versus Human Bait as a Mosquito Sampler

By Robert M. Stabler, Department of Zoology, University of Pennsylvania and Delaware County (Pa.) Mosquito Extermination Commission

Introduction

Those interested in determining the extent and variety of an adult mosquito population in a given area have long sought sampling methods which would give an accurate cross section of the insect concentration. Inspection of diurnal rests and baiting with horses, cattle, goats, chickens and rabbits, are among the methods tried with varying success. The fact that many insects are attracted to light was the basis for the development of the New Jersey mosquito trap, which was devised in an effort to establish a sampling device free from the many objectionable features inherent in some of the other procedures.

The New Jersey trap has been a boon to mosquito workers. It has not proven a panacea, however, and its catches are still being contrasted with those obtained by the other methods, in an effort toward further evaluation. Although Carpenter (1942) felt that the trap compared favorably with hand collection methods for measuring imago densities of *Anopheles quadrimaculatus,* Huffaker and Back (1943) concluded that this method did not serve as a good indicator of concentrations of

this species. They state further that they are convinced that the New Jersey trap does not catch a representative sample of a mixed mosquito population.

In order to secure data which might further elucidate the bait-versus-trap controversy, the writer spent considerable time during July and August of 1944 allowing himself to be bitten, as a control on a New Jersey trap which was operating a short distance from his bite site. The results are given below.

Method

On 22 occasions in July and 23 in August, the light trapping and baiting were done on the same evenings. Each location was at a fixed spot, 82 feet apart. The light trap was in plain view of the baiting site.

The baiting costume was designed for the greatest collecting efficiency. A coat prevented biting on areas which were difficult to reach, and the wearing of shorts insured a generous feeding area. Sitting on a low stump, the baiting was begun at approximately 8:45 P.M., Eastern War Time, and continued for 30 minutes. At this time of day the light had faded to a point where it was just possible at the beginning of operations to catch the first few mosquitoes with the unaided eye. A flash light, shaded so that it gave only very weak illumination, was used as darkness increased.

A vial, with chloroform as the killing agent, was placed over each feeding mosquito until she was immobilized. It is the writer's belief that practically every individual which alighted to feed during the whole 1,350 minutes of baiting was successfully taken. On rare occasions, when feeding was heaviest, a female would engorge and fly off before she could be caught.

The light trap, operating with a 25 watt, white frosted bulb, was turned on as baiting commenced, and continued to run throughout the night. It was switched off at about 7:00 A.M.

Only female mosquitoes are considered in these analyses. Also, whereas it is known that several species of *Culex* were taken (*C. pipiens, C. salinarius, C. apicalis,* and probably *C. restuans*), these are lumped together in the computations be-

TABLE

Mosquito Species	Total catch	*Culex* species	*Aedes vexans*	*Aedes canadensis*	*Aedes cantator*	*Aedes sollicitans*	*Aedes trivittatus*	*Aedes taeniorhynchus*	*Anopheles punctipennis*	*Mansonia perturbans*	*Uranotaenia sapphirina*	*Psorophora confinis*	*Psorophora ciliata*	*Orthopodomyia signifera*	*Culiseta inornata*
Light Trap Alone															
Number	467	318	94	2	2	7		1	27		1	4		2	1
% of catch		68.1	20.1	0.43	0.43	1.5		0.21	5.7		0.21	0.85		0.43	0.21
Bait Catch Alone															
Number	1104	888	102	1	60		1	1	47	2			1		
% of catch		80.4	9.2	0.09	5.4		0.09	0.09	4.3	0.17			0.09		
Trap and Bait Catches Combined															
Total number	1571	1206	196	3	62	7	1	2	74	2	1	4	1	2	1
% taken by trap	29.7	26.4	48.0	66.7	3.2	100	0	50.0	36.5	0	100	100	0	100	100
% taken by bait	70.3	73.6	52.0	33.3	96.8	0	100	50.0	63.5	100	0	0	100	0	0

cause of the difficulty in satisfactorily separating the females of these species.

Observations

On examining the table it is seen that a total of 1571 mosquitoes was taken, 476 (29.7 per cent) by trap, and 1104 (70.3 per cent) by bait. It is noted at once that, at least with the particular bait individual employed, baiting was numerically considerably more efficient as a mosquito attractant than was a 25 watt lamp. The 1104 specimens caught feeding means that a mosquito was taken for each 1.2 minutes of the entire 1350 minute bait period.

Briefly considering the bait collection alone (1104 females), we find that most of the mosquitoes were *Culex* (888 specimens), with *Aedes vexans* next in order (102 specimens). These, then, comprised nearly 90 per cent of all biters. *Aedes cantator,* a fierce biter, was represented by 60 individuals (5.4 per cent), while *Anopheles punctipennis,* which bred generally in the area, accounted for 47 (4.3 per cent).

Compared with these data, the light trap catch (467 females) likewise had *Culex* (318 individuals) and *A. vexans* (94 individuals) constituting nearly 90 per cent of the total. The trap attracted *A. punctipennis* in about the same percentage (5.7 per cent; 27 individuals) as did the bait, but was strikingly ineffective for *Aedes cantator* (2 specimens; 0.43 per cent). The other species listed were taken by one method or the other in numbers too small to warrant comparison.

Even more interesting are the figures obtained when both attraction methods are considered together. The general superiority of the human bait over white light (25 watt) has already been noted. Baiting is obviously of no value, however, where males and non-biting species are concerned. Of 1205 *Culex* mosquitoes caught, almost three-quarters of these purely pest types responded to bait (73.6 per cent). *Aedes vexans,* the other pest species present in fair numbers (196 females), was taken approximately equally by both methods. The anopheline, *A. punctipennis,* found bait more attractive than light by a ratio of somewhat less than two to one.

The greatest divergence was again noted for *Aedes cantator*. Of the 62 females taken, 60 were biters, only 2 (3.2 per cent) going into the trap.

Discussion

In the survey reported here there are a number of points to be noted. First, the two attraction sites were not very far apart (82 feet). In a study made in Puerto Rico, Pritchard and Pratt (1944) found that bait (horse, calf) near a light attracted abnormally high numbers of anophelines. When moved to a position 200 feet from the light there was a sharp decline in the baited catch. What the baiting results would have been in the present experiment, had the bait site been further removed from the trap, we of course do not know.

Also, there is known to be a marked difference in attractability among human beings. Weathersbee (1944), in testing this point on Puerto Rican *Anopheles albimanus,* found horses over twenty times more efficient than men, with individual equines being relatively uniform in attractiveness, while different human beings varied considerably in this respect. Although not tested in this experiment, the writer knows from past experience that among human beings he appears to be a better than average attraction. It is possible, therefore, that had a different bait-subject similarly exposed himself to the ravages of these insects, the attraction rates might have varied from the present figures.

The baited catches in the present report were made during the 30 minute period beginning at dusk. For most local forms this is certainly the time of greatest activity and food-seeking, a fact which was fully appreciated by the baitee. In this connection, it was pointed out by Huffaker and Back (1943) that from an activity peak reached at dusk, most species of mosquitoes decline in this respect during the first three hours thereafter. The decline in activity was most noticeable after the first hour. *Anopheles quadrimaculatus,* on the other hand, they found to be an exception, since there was an increase in its activity until midnight at least.

From the above discussion it can be seen that the light trap catch may have suffered somewhat, first by its nearness to the bait station, second by the fact that baiting was done during a period of great mosquito activity, when food seeking was at its height, and possibly also because an apparently attractive individual did the baiting. On the other hand, the baiting lasted only 30 minutes, whereas the light trap ran all night, thus being in operation during the dawn period of revived activity. The trap partly compensated, too, by taking numerous engorged mosquitoes.

There is also the question as to whether or not the New Jersey trap catches a representative sample of a mixed mosquito population. Huffaker and Back (1943) felt that it did not. Because of the smallness of the present totals, the data are hardly more than suggestive. However, it appears that, for the few species with sufficient numbers for comparison, the trap attracted roughly the same percentage as the bait. The striking exception was the exceedingly homophilous *Aedes cantator*.

Finally, from the point of view of overall efficiency, this particular bait certainly eclipsed the light trap by about 2.5 to 1. If this ratio were adjusted to compensate for the great discrepancy between the operating times of the respective attracting forces, the difference would be still greater. As compared with the trap catches, the bait take for *Culex* (mainly *pipiens* and *salinarius*) was almost 3 to 1, for *Anopheles punctipennis* it was something less than 2 to 1, for *Aedes vexans* about 1 to 1, and for *Aedes cantator* just short of 100 per cent.

Summary and Conclusions

1. For 45 nights during July and August (1944) the writer exposed himself to the bites of mosquitoes for 30 minutes, beginning at dusk (approximately 8:45 to 9:15 E.W.T.).

2. A New Jersey light trap (25 watt, white frosted lamp) was operated during the baiting period and throughout the night. The sites were 82 feet apart.

3. A total of 1571 mosquitoes was caught (females only are included). 70.3 per cent were attracted to the bait, 29.7 went to the trap.

4. Individually, the *Culex* species (1206) preferred the bait (73.6 per cent) to the trap (26.4 per cent); *Aedes vexans* was about equally attracted; of 74 *Anopheles punctipennis*, 27 went to the light while 47 bit; and *Aedes cantator* was quite bloodthirsty, for of 62 taken, 60 were caught feeding. Several other species were taken in numbers too small for comparison.

5. Roughly speaking, the human bait and light trap attracted about equal percentages of the more numerous types of mosquitoes (*Aedes cantator* was the exception). For sheer numbers, on the other hand, the particular bait individual used proved a much better attractant than the 25 watt lamp.

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Another European Entomologist Safe

Mr. H. E. Woodcock of Chicago writes that M. Stempffer of Paris has recently written him. M. Stempffer is one of the best-known Lepidopterists in France, being particularly interested in the little blues of the genus *Lycaena*. A veteran of the first World War, he volunteered again but was held at his position in the Bank of Paris until the Germans took that city. He had joined the Free French and so had to flee, but he managed to return to Paris in 1940 and from then on played a role in the propaganda against the invaders of his country. Being fortunate enough to escape detection he is now free and apparently trying to renew his old entomological friendships.

Nomenclature and Semantics

By GEORGE STEYSKAL, Detroit, Michigan

The publication of Mayr's recent book [1] has more sharply brought out the need for the universal recognition of the subspecies. Mayr has adequately defined the category and shown the need for codical regulation concerning it. Linsley's article in this journal [2] outlines what to my belief is a thoroughly desirable solution of the problem and further stresses the point that the subspecies, altogether similar to the species *nomenclatorially,* is the only infraspecific [3] category that should receive names of codical status.

It is my intention here to point out the help that the relatively new science of semantics or semasiology, the study of the "meaning of words," can contribute to biological nomenclature. Much is said in nomenclatorial discussions about "concepts," but little about "referents." It is a clear understanding of the relationship of the concept to its referent (its basis in the external world) and its reference (name), which is of value both to the biologist and to the semasiologist, to the former in providing knowledge of the nature and "life-history" of concepts and the handles they bear called names and to the latter in providing source material for the study of the most orderly and deliberate method man has devised for making contact with the "outside world." A sound and at the same time interesting approach to semantics may be made with Chase,[4] Ogden and Richards,[5] and Hayakawa,[6] at least one of which should be required reading for any biologist, whether or not he is interested in nomenclature.

[1] Mayr, E. 1942. Systematics and the origin of species. Columbia Univ. Press, N. Y.

[2] Vol. LV (no. 9) : 225–232, Nov., 1944.

[3] The hyphen after infra- is unnecessary, *v.* dictionaries.

[4] Chase, Stuart. 1938. The Tyranny of Words. Harcourt, Brace and Co., N. Y.

[5] Ogden, C. K., and Richards, I. A. 1936, rev. ed. The Meaning of Meaning. Harcourt, Brace and Co., N. Y.

[6] Hayakawa, S. I. 1939. Language in Action. Harcourt, Brace and Co., N. Y.

The frequent use of the term "changing concepts" in regard to organisms which are named suggests an erroneous conception of the relationship between concept and referent. The concept of a species (or subspecies or lower category) does not change from the time of its original description (possibly based on a referent consisting in a single poor specimen) but rather *grows* as more is learnt concerning it and other members of the group of individuals comprising the whole referent. The name (reference) remains fixed, the referent remains fixed except for evolutionary changes, but the concept grows as the combined human mind through investigation and publication acquires knowledge concerning the referent. It is inherent in the scientific method that reservations as to the completeness of new concepts are held, that the definiteness of the concepts is in direct proportion to the knowledge available concerning the referents. To cite a hypothetical example: *Alpha beta* Smith 1944, known from a single incomplete female, is the reference to a very vague concept, while *Alpha alpha* J. Doe 1864, known from thousands of specimens, considerable observation, some experimentation, and the subject of many pages of print, is immensely more definite and "grown-up" as a concept. The concept will continue to grow as long as mankind studies its referent, but the reference, its name, will remain identical once the prior one is established. The independence of phonetic and emotional considerations and the universality of biological names make them practically unique from a semantic point of view.

On the other hand, a concept can also die. *Alpha gamma,* described as a species, may later be proven to be no more than a phenotypical variation of *Alpha alpha.* The concept therefore is erroneous, has no referent, and dies. It becomes part of another concept, that of "phenotypical variation of *Alpha alpha.*"

Names of organisms cannot express or even imply any other relations beyond that of the subspecies to the species and the species to the genus. There is nothing in the name of the genus (except the familiotype[7]) which has anything to do with the

[7] There is a need for a term analogous to genotype (generitype) for the genus upon which a family name is based. I propose the term "familiotype" (from Latin *familia* + *typus*).

family or any other supergeneric category. There is an extremely large number of groupings, super- and infraspecific, and it should be obvious that inclusion of them into nomenclature is highly impractical. They are the subject of synopses, phyletic charts, tables, and more extended discussion. The fluidity of these group concepts, the difficulty or even impossibility of acquiring real knowledge concerning their referents (which include a time factor) precludes such simple reference to them as names.

Because a species may be named *Alpha gammoides* implies no more relationship to an organism or group named *gamma* than one named *Alpha mohawkana* would have to a Mohawk Indian. Probably the coined names, arbitrary combinations of letters, are best.

Notes on Some Hesperiidae, with New Records for the United States (Lepidoptera, Rhopalocera)

By H. A. Freeman, Pharr, Texas

Aguna asander (Hew.)

While examining some specimens collected by Mrs. E. J. Kelso at Pharr, Texas, a fresh male *asander* (Hew.) was found. There was no date on this specimen and the only information imparted to the writer by the collector was that the specimen was collected in her yard at Pharr. This is the first record of this tropical American species having been collected in the United States. Previous records reveal this species to occur from Mexico to southern Brasil and at least in some of the West Indies.

Astraptes hopfferi (Ploetz)

There seems to be considerable uncertainty as to the exact relationship existing between *creteus* (Cramer) and *hopfferi* (Ploetz), as some students of the hesperioidea consider *hopfferi* to be a form of *creteus*. Mr. E. L. Bell believes that *hopfferi* is sufficiently distinct superficially to be kept apart for the present, at least.

The writer collected a female *hopfferi,* October 21, 1944, at Pharr, Texas. This is the first time that this species has been recorded for the United States. This specimen was visiting jasmine blossoms along with *Astraptes fulgerator* (Walsh), which occurs commonly at Pharr, during October, November and December.

Spathilepia clonius (Cramer)

This tropical American species occurs over a comparatively wide range south of the border of the United States. A male specimen was collected at Pharr, Texas, November 12, 1944, by the writer. It was feeding on zinnias in one of the flower gardens in the city limits. This is the first time that this species has turned up in the United States.

Lerodea edata (Ploetz)

Information received from Mr. E. L. Bell reveals that this species previously was found from Mexico to Venezuela and Guiana. The writer collected 2 males and 8 females of this species, at Brownsville and Pharr, Texas, during May, August, September, November, December and January 1944–45. About half of the specimens were very fresh indicating that this species is breeding in this section of Texas. This is the first record of this species occurring in the United States. Mr. Bell kindly compared two of my specimens with those in the American Museum of Natural History and informed me that they were the same as specimens they have under the name *edata* (Ploetz). There is considerable variation exhibited among my ten specimens as to size and number of spots on the primaries. The writer has seen several specimens from various localities in Mexico and the same variability was present in all of these.

Godmania malitiosa (H–S.)

Two males of this species were collected at Pharr, Texas, one specimen, October 14, 1944 and the other October 15, 1944, by the writer. This is the first time that this species has been collected in the United States, or any member of the genus *Godmania* Skin. & Rams., for that matter.

The writer sent one of the specimens to Mr. Bell for examination and he said it compared fairly well with Cuban specimens (type locality) of *malitiosa* but differed from Godman's figure of that species. Godman records *malitiosa* from Mexico to Costa Rica but apparently he was as confused and uncertain about his identifications in this genus as most everybody else is at the present time. Mr. Bell states that it is very difficult to get sufficient material in this genus to do scientific revisional work. Apparently specimens of all of the species are subject to considerable variation.

Perichares phocion dolores (Reakirt)

Since recording this species for the United States,[1] based on a specimen collected by Mrs. E. J. Kelso, at Pharr, Texas, the writer has collected a fresh male specimen at Pharr, December 9, 1944. This specimen was feeding on petunias around 5:30 P.M.

Spurious Veins in the Wings of Exoprosopa fasciata Macq. (Diptera)

By S. W. Frost, The Pennsylvania State College

It is well known that the number and position of the veins of the wings of insects generally are constant for a species. Seldom is the contrary true. Upon this fact the nomenclature of wing veins has been based. At most, the degree of divergence of veins or the position of certain of these may vary slightly. In the more specialized Diptera such as the Muscidae, Tachinidae, etc. these variations are exceedingly slight and venation is considered a constant character. The venation of *Exoprosopa fasciata* Macq. shows quite a different situation with remarkable variation in the number and position of extra veins.

Sixty specimens of *Exoprosopa fasciata* Macq., collected in the vicinity of State College, Pa., were examined. Only 22 of

[1] Ent. News, vol. 56, p. 5, Jan. 1945.

these * show what might be considered normal venation. More than fourteen distinct variations are described.

Those who have studied the Bombyliidae realize that they generally show numerous spurious veins. *Exoprosopa fasciata* Macq. is probably more variable than other species. Some variations might be expected, for the Bombyliidae are primitive Diptera with a rather well developed system of wing veins. This could be said of other families such as the Asilidae.

Some of the variations do not show in the table. The base of R2 + 3 may be gently curved or distinctly angulate. The same is true of the median cross vein and of R4. Often spurs are present when the veins are angulate at these points. The spurs

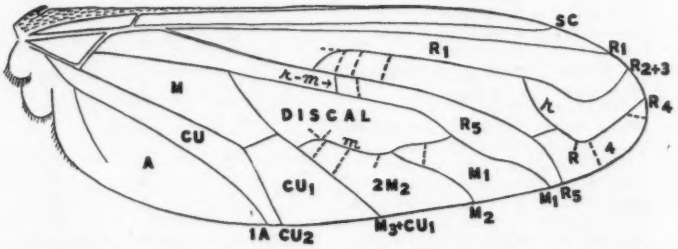

Figure 1. Composite wing of *Exoprosopa fasciata* Macq. showing the variation in the position of the base of R2 + 3 and the spurious veins.

from the angle of the median cross vein may extend basad or cephalad. Generally the position of the base of R2 + 3 is the same in both wings but in five specimens this is not so, the base of R2 + 3 being distad or opposite the radio-median cross vein in one wing and basad or opposite in the other. In one specimen it is distad in one wing and basad in the other.

There is some variation in the color of the wings. In a few cases the wing veins are more broadly darkened. The clear area at the forking of M1 + 2 from M3 is usually confined to the distal end of cell M but often extends into the basal corner of the distal cell.

* Although 33 specimens show the normal position of the base of R2 + 3, 11 of these show other variations.

Most of the variations occur in both wings, that is the wings with such variations are symmetrical. This is particularly true of the position of the base of R2 + 3 and the branching of R4 at its tip. As indicated in the figure and in the table, R2 + 3 usually arises basad of the radio-median cross vein and this is taken to be the normal type of venation. It is interesting to note that most of the variations occur near the center of the wings.

Summary of spurious veins in *Exoprosopa fasciata* Macq.

Character	Present in both wings	Present in right wings	Present in left wings
Base of R2 + 3 basad of r − m	33	1	2
Base of R2 + 3 distad of r − m	14	1	2
Base of R2 + 3 opposite r − m	7	3	3
Vein R4 branched at tip	3		
Cu2 and 1A converging at margin of wing			1
Vein M2 incomplete			1
2 r − m cross veins			1
Extra vein between R2 + 3 and R5			1
Cell R4 divided by extra vein			1
Cell M1 divided by extra vein		1	
Cell 2M2 divided by extra vein		3	
Spur from angle of m into discal cell	3	6	7
Spur from angle of m into 2M2		1	3
Spur at base of R2 + 3	1	1	1
Spur from R4 into cell R4		1	1
Total Variations	28*	18	24

* Not including 33 specimens with base of R2 + 3 basad of r − m which is taken to be the normal condition.

Changes in Editorship

Various events are forcing changes in the editorial staff. Authors are requested to note that Dr. R. G. Schmieder is assuming managing editorship beginning now, and all manuscripts and communications pertaining thereto should be addressed to him at the address given on the inside of the front cover.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

A peculiarity of many insects is that they regularly possess certain bacterial symbionts which live *inside the cells* of their body. Usually these intracellular bacteria are found in only certain tissues and cells and have a rigid cycle of development and definite mode of transmission *through* the egg. For instance, in a cockroach (*Blatella germanica*) they are found in all eggs in a definite position; as the egg develops into an embryo the symbionts migrate along definite paths to definite parts of the eggs; and finally at the end of a complicated route they become localized in the adipose (fat) tissue and ovaries. In some cases (certain beetles) they are not inherited through the eggs but occur on the *outside* of the egg and infect the larva when it hatches. Bacteria, symbiotic or otherwise, have been reported from the tissues of many insects: *e.g.* cockroaches, various bugs, aphids, coccids, beetles, lice, mosquitoes and ants. The specific identity of the bacteria, or bacteroids as they are sometimes called, is uncertain. Attempts to culture them for study have given controversial results and some authors do not think anyone has been really successful with the truly intracellular forms.[1]

Numerous speculations have been made concerning the possible role of these microorganisms. One of these suggestions has been that the bacteroids play some role in nutrition, possibly furnishing some growth factors. It is well-known that insects commonly require vitamins of the B group and sterols related to vitamin D.[2] Recently it has been possible to prove that at least some of these bacterial symbionts furnish B vitamin to their insect hosts. Fraenkel and Blewett [3] first pointed out that those

[1] Gier, Biol. Bull., 71: 433–452, 1936.

[2] See *e.g.* Fraenkel, Reid & Blewett, Biochem. Jour., 35: 712–720, 1941; Wigglesworth, Principles of Insect Physiology, 1937; Heilbrunn, An Outline of General Physiology, 1943.

[3] Biochem. Jour., 37: 692, 1943.

species of grain beetles that have such symbionts have lower B vitamin requirements than those which do not. Then they succeeded in proving this correlation by eliminating the symbionts and showing that the B vitamin requirements increased and indeed that the deflorated beetles needed types of B vitamins that were completely superfluous to infested beetles.[4]

Tribolium confusum and *Ptinus tectus* lack intracellular symbionts and require thiamin, riboflavin, nicotinic acid, pyridoxine and pantothenic acid. *Lasioderma serricorne, Sitodrepa panicea* and *Silvanus surinamensis* possess bacterial symbionts and have lower B vitamin requirements. Normal *Lasioderma* requires no B vitamins, normal *Sitodrepa* needs only thiamin, but normal *Silvanus* requires riboflavin, nicotinic and pantothenic acids. Deflorated specimens of these species require all five of the B vitamins, i.e. have the same requirements as the species that normally lack these symbionts. Since it was possible to show that the B vitamins requirements are the same for all of these species and that the seeming differences are due to the symbionts, it follows that the symbionts of different insect species furnish different fractions of the insect's needs. Some of the bacterial symbionts furnish all of the insect's B vitamin requirements; others are less efficient in this respect and furnish only some of those needed.

Obtaining deflorated beetles for verification of the hypothesis was relatively easy since in these cases the bacteroids are on the outside of the egg and contaminate the larva at the time of hatching. The eggs were simply sterilized by immersion for two minutes in 5% chloramine in 70% alcohol, and thereafter handled with precautions to prevent recontamination. Defloration would be difficult (impossible?) in insects which have the symbionts inside the egg.

Although the symbionts play this big role in furnishing B vitamins, they seemingly contribute nothing usable for the insects' sterol ("vitamin D") requirements.

A. G. RICHARDS, JR.

[4] Proc. Roy. Soc. London, 132B: 212-221, 1944.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Carpenter, M. M.—Bibliography of biographies of entomologists. [119] 33 (1): 1–116. **David, W. A. L.**—Insecticidal sprays and flying insects. [31] 155: 204–205, ill. **Hemming, F.**—Recent work by the International Commission on Zoological Nomenclature. [4] 76: 189. **Henderson, William Williams.**—Obituary note. [120] 5: 23–24, port. bibl. **Rohwer, S. A.**—Post-war entomological problems. [12]: 37: 830–35. **Sanborn, Charles Emerson, 1877–1944**—Obituary. [12] 37: 857–58, photo. **Sanderson, Dwight, 1878–1944**—Obituary. [12] 37: 858–59, photo. **Weiss, H. B.**—Thomas Jefferson and economic entomology. [12] 37: 836–41.

ANATOMY, PHYSIOLOGY, MEDICAL—Ahmad, M.—Morphology and biology of Rhogas testaceus, a braconid internal parasite of spotted bollworms of cotton. [123] 5: 189–205, ill., 1943. **Coon, B. F.**—Effects of paralytic insecticides on heart pulsations and blood circulation in the American cockroach as determined with a fluorescein indicator. [12] 37: 785–89. **Crowson, R. A.**—(See under Coleoptera.) **Deoras, P. J.**—On the comparative morphology and evolution of adult Trichoptera. [123] 5: 177–88, ill., 1943. **Flanders, S. E.**—Bisexuality of uniparental hymenoptera, a function of the environment. [90] 79: 122–41. **Ford, E. B.**—(See under Lepidoptera.) **Frings, H.**—Loci of the olfactory end-organs in the honey bee, Apis

mellifera. [42] 97: 123–34. Gustatory rejection thresholds for the larvae of the cecropia moth, Samia cecropia. [92] 88: 37–43. **Hovanitz, W.**—Physiological behavior and geography in control of the alfalfa butterfly. [12] 37: 740–45. **Husain, Lahore & Mathur.**—Influence of temperature on the growth in weight and size of the hopper (Schistocerca gregaria). [123] 5: 107–16, 1943. **Kvicala, B.**—Selective power in virus transmission exhibited by an aphis. [31] 155: 174–75. **Mathur, C. B.**—Site of the absorption of water by the egg of the desert locust. [123] 5: 35–40, 1943. **Mukerji & Chaudhuri.**—On the anatomy of the alimentary system of the termite T. redemanni. [123] 5: 59–88, ill., 1943. **Park, Ginsberg & Horwitz**—Gene affecting body-color and fecundity of Tribolium confusum. [23] 18: 35–51. **Pradhan & Aren.**—Anatomy and musculature of the mouth-parts of Scirpophaga nivella (Pyralidae), with a discussion on the coiling and uncoiling mechanisms of the proboscis in Lepidoptera. [123] 3: 179–95, ill., 1941. **Rakshpal, R.**—On the structure and development of the male genital organs of Tetrastichus pyrillae (Chalcid). [123] 5: 143–50, ill., 1943. **Rosenstiel, Ferguson & Mote.**—Some ecological relationships of Cnephasia longana. [12] 37: 814–17. **Russell, Knipe, Rao & Putnam.**—Some experiments on flight range of Anopheles culicifacies. [42] 97: 135–64. **Sen, S. K.**—Method of cutting sections of ticks and insects. [123] 3: 51–54, 1941. **Shrader, F.**—Regular occurrence of heteroploidy in a group of Pentatomidae. [92] 88: 63–70. **Smith, K. M.**—Transmission by insects of a plant virus complex. [31] 155: 174. **Zukel, J. W.**—Some effects of phenothiazine, phenothiozone and thionol on Periplaneta americana. [12] 37: 796–808.

ARACHNIDA AND MYRIOPODA—Baker, E. W.—Mites of the gen. Tenuipalpus (Trichadenid). [10] 47: 33–38, ill. (*). **Chamberlin, R. V.**—Two millipeds from S. California. [95] 57: 113–16, ill. **Ewing, H. E.**—Notes on the taxonomy of the trombiculid mites. [95] 57: 101–104. **Hoff, C. C.**—New pseudoscorpions of the subf. Lamprochernetinae. [40] 1271: 12 pp., ill. (S). Hesperochernes canadensis, a new chernetid pseudoscorpion from Canada. [40] 1273: 4 pp., ill. Pseudoscorpion gen. Albiorix. [40] 1277: 12 pp., ill. (Sk). **Thorp & Woodson.**—Black widow, America's most poisonous spider. [Univ. N. Carolina Press] 222 pp., ill.

THE SMALLER ORDERS—Eichler, W.—Mallophagen-synopsis, III. Gen. Laemobothrion. [100] 137: 52–63. **Holland, G. P.**—Notes on some northern Canadian Siphonaptera, with the descr. of a n. sp. [4] 76: 242–46, ill. **Ricker, W. E.**—Some Plecoptera from the far north. [4] 76: 174–85, ill. **Walker, E. M.**—Nymphs of Enallagma calusum and E. boreale. [4] 76: 233–37, ill.

ORTHOPTERA—Ander, K.—Revision der Orthopterensammlungen Zetterstedts. [Lunds Univ. Arssk.] N. F., Av. 2, Bd. 38 (7): 23 pp. (1942). **Barnes, O. L.**—Time schedules of grasshopper surveys in Arizona. [12] 37: 789–95. **Deoras, P. J.**—Internal anatomy and descr. of Hemimerus deceptus v. ovatus, with remarks on the systematic position of Hemimeridae. [123] 3: 321–33, ill., 1941. **Henderson, W. W.**—Four devastating melanopli found in Utah. [120] 5: 1–22, ill. **Tanner, V. S.**—European earwig found in Provo, Utah. [120] 5: 22.

HEMIPTERA—Fennah, R. G.—New Neotropical Fulgoroidea. [40] 1265: 9 pp., ill. New Dictyopharidae from the New World (Fulgorid). [95] 57: 77–94, ill. (k). **Plummer, C. C.**—New Membracidae from Central Amer. [10] 47: 39–44, ill. **Rakshpal, R.**—On the post-embryonic development of the male genital organs in Aleurodidae. [123] 3: 1–12, ill., 1941.

LEPIDOPTERA—Bowman, K. Additions and corrections to the check-list of the macrolepidoptera of Alberta. [4] 76: 191–92. **Ford, E. B.**—Studies on the chemistry of pigments in the Lepidoptera, with reference to their bearing on systematics. 4. The classification of the Papilionidae. [36] 94: 201–23. **Freeman, T. N.**—New psychid from Quebec. [4] 76: 186–7, ill. **Hovanitz, W.**—(See under physiology.) **McDunnough, J.**—New Arizona Hydriomena. [4] 76: 173–4. Two new races of Theclinae from south. Brit. Columbia. [4] 76: 190–91. Notes on Chambers' coleophorid types in the Museum of Comp. Zool. Cambridge, Mass. [4] 76: 237–41. **Rosenstiel, Ferguson & Mote.**—(See under physiology.) **Travassos, L.**—Ctenuchidae de Monte Alegre. Interessante anomalia em um Cosmosoma teuthras. [77] 4: 29–36; 17: 187–96, ill. (S).

DIPTERA—Olson & Keegan—The mosquito collecting program of the seventh service command. [12] 37: 780–85. **Fluke, C. L.**—Melanostomini of the Neotropical Re-

gion (Syrphid). [40] 1272: 29 pp., ill. (*k). **Pennak, R. W.**—Notes on mountain midges (Deuterophlebiidae) with a descr. of the immature stages of a n.sp. from Colorado. [40] 1276: 10 pp., ill. **Stone, A.**—Mosquito synonym. [10] 47: 38–39. **Cooper & Rapp.**—Check list of the Dixidae of the World. [4] 76: 247–52.

COLEOPTERA—Bernhauer, M.—Neue Staphyliniden aus Kostarika. [100] 138: 1–27 (1942). **Blake, D. H.**—Five new flea beetles from the West Indies. [91] 35: 89–92, ill. **Brundin, L.**—Zur Kenntnis einiger in die Athetauntergat. Metaxya gestellten Arten (Staphylid). [Lunds Univ. Arssk.] N. F. Av. 2, Bd. 39, (4): 37 pp., ill. (1943). **Crowson, R. A.**—Further studies on the metendosternites in Coleoptera. [36] 94: 273–310, ill. **Fiedler, C.**—Sudamerikanischen Arten der gat. Gasterocerus (Curculion). [100] 140: 221–47 (*). Neue Arten der gen. Acalles u. Rhyssomatus aus Sudamerika (Curculion). [100] 140: 203–19 (1942). **Hatch & Fender**—Notes on Zacotus matthewsii. [4] 76: 188. **Strohecker, H. F.**—New sps. of Endomychidae. [40] 1275: 3 pp., ill. (S).

HYMENOPTERA—Bohart, R. M.—New sp. and subsp. of Rygchium from N. Amer. (Vespid). [10] 47: 45–49, ill.

LIST OF JOURNALS CITED

4.—Canadian Entomol. 10.—Proc. Entom. Soc. Washington. 12.—Journal Economic Ent. 31.—Nature, London. 36.—Trans. R. Entom. Soc. London. 40.—Amer. Museum Novitates. 42.—Jour. Experimental Zool. 77.—Papeis Avul. Dept. Zool. Secret. Agr., S. Paulo. 90.—American Nat. 91.—Jour. Washington Acad. Sci. 93.—Biological Bulletin. Proc. Biolog. Soc. Wash. 100.—Zoolog. Anzeiger (Reproduced by Alien Prop. Custodian). 119.—Amer. Midland Nat. 120.—Great Basin Nat., Provo. Utah. 123.—Indian Jour. Entom.

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Coleoptera—Will exchange mounted and labeled specimens from North America. All groups except Rhynchophora. G. P. Mackenzie, 1284 Sherwood Road, San Marino, Calif.

Lepidoptera—Should like to hear from collectors interested in species from central Alberta and Saskatchewan. Would collect other Orders. Paul F. Bruggemann, R. R. 1, Furness, Sask., Canada.

Lampyridae of U. S. and Canada wanted from the South and West, especially Photinus and Pyractomena for revisional study. Buy or exchange. J. W. Green, R. D. 2, Easton, Pa.

Lepidoptera—Would like to exchange Californian butterflies, noctuids, geometrids, etc. for eastern specimens. Glenn E. Pollard, 500 Clark Drive, San Mateo, Calif.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

JUST PUBLISHED

A CATALOGUE AND RECLASSIFICATION OF THE NEARCTIC ICHNEUMONIDAE

(HYMENOPTERA)

By HENRY K. TOWNES, JR.

(Memoirs of the American Entomological Society, Number 11)

The parasitic habits of this group of insects render them of great economic importance and biological interest, but because of the handicaps of an extremely scattered literature and confused taxonomy, a vast amount of preparation is required of the prospective worker, if his results are to be of lasting value.

The author has made the Ichneumonidae his major study, and also made extensive collections of this family in various parts of North America, and in the preparation of the present catalogue, has examined nearly all the types of the American species in this country.

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